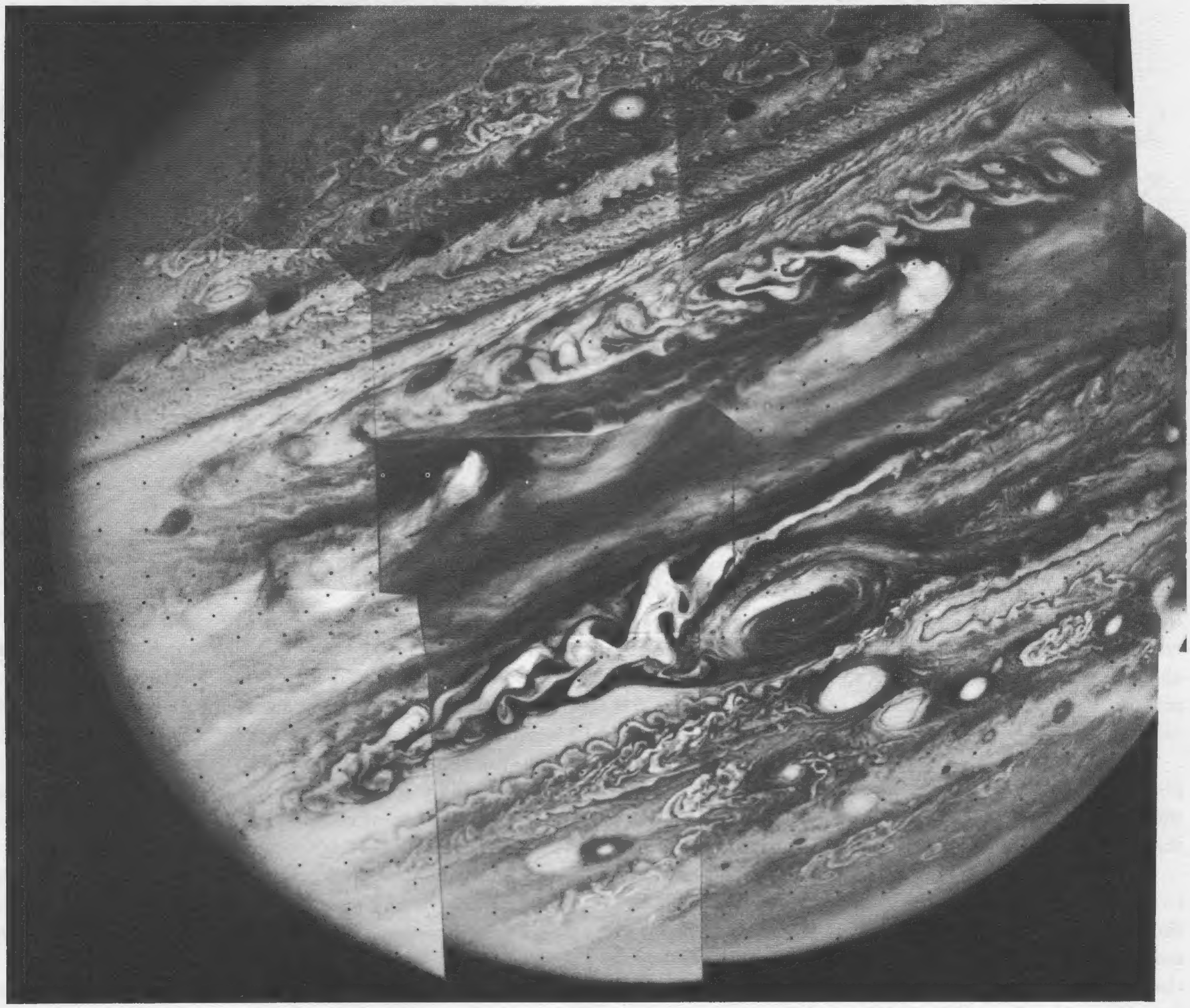
Voyager Bulletin

MISSION STATUS REPORT NO. 37 MARCH 2, 1979



COLOSSUS – Nine individual photos comprise this Jupiter mosaic, taken through a violet filter by Voyager 1 on February 26. At the time, the spacecraft was 7.8 million km (4.7 million mi) from the planet. Distortion of the mosaic, especially noticeable where portions of the limb have been fitted together, is caused by rotation of the planet during the 96-second intervals between individual frames. The complex structure of the cloud formations seen over the entire planet gives some hint of the equally complex motions in the Voyager time-lapse photography. The smallest atmospheric features seen in this view are approximately 140 km (85 mi) across.

NASA

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Space Administration

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Encounter Minus 4 Days

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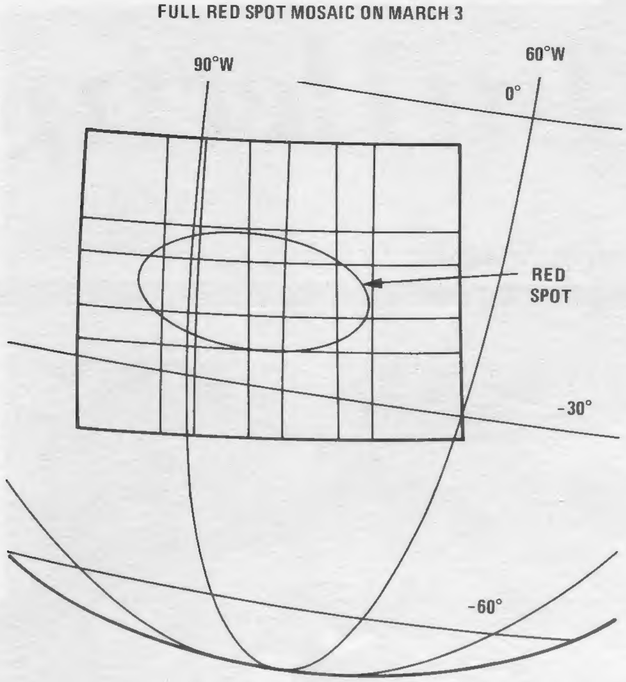
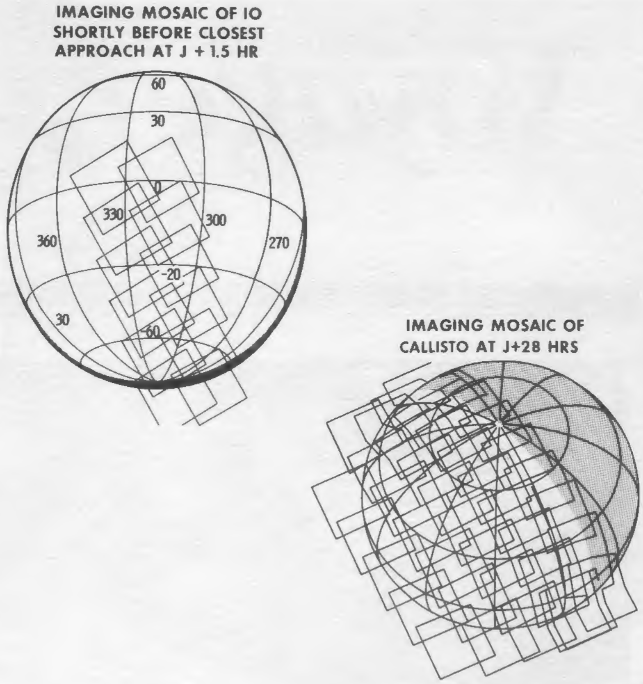




MOSAICS — Voyager 1 will record many mosaics of Jupiter and its satellites, zeroing in on some features several times. Near midnight (PST) on March 3, for example, Voyager 1 will mosaic the Great Red Spot in a three-color 3 x 4 mosaic (above) from a distance of about 1.8 million km (1.1 million mi). The last mosaic of the Great Red Spot as a whole will begin about 8:51 p.m. (PST) on March 4, from a distance of 668,000 km (415,000 mi). Eighty-one imaging frames will be taken in 43 minutes, in a 3 x 9 two-color map. Mosaics will also provide high resolution maps of several of the satellites.

Earth, Sun Occultations

About 3-1/2 hours after closest approach to Jupiter, at about 8:23 a.m. (PST), Voyager 1 will begin to disappear behind the planet (as seen from Earth). First Earth and then the Sun will be blocked (occulted) from the spacecraft's view by Jupiter's bulk. The occultations, each lasting about two hours, overlap each other for about an hour, and provide opportunities for unique radio science and ultraviolet measurements.

As the spacecraft slips around into the shadow of the planet, it will track the virtual image of the Earth around the limb (disk edge) of the planet. Gyro drift turns, slower than a clock's hour hand, will follow the image.

Prior to the occultation, the spacecraft will be tuned to S-band high power and X-band low power to equalize the signals through the atmosphere. The distortion of the radio signals as they pass through increasing depths of clouds will tell much about the shape and concentration of materials in the ionosphere and atmosphere.

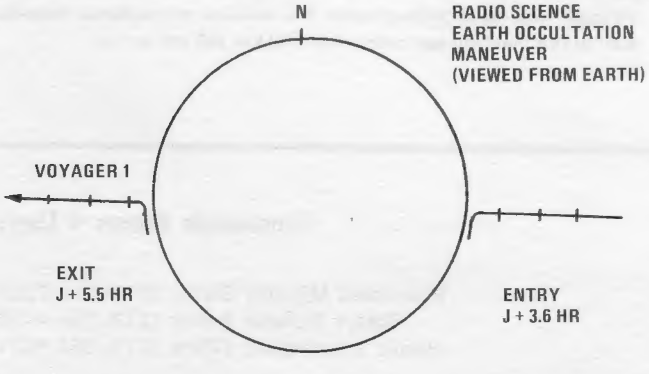
Then, in a series of commanded turns, the spacecraft will turn so that the ultraviolet spectrometer (UVS) slit is tangent to the planet's limb as Voyager, still in Earth occultation, enters the overlapping Sun occultation zone. The spacecraft antenna will then be pointing at the north limb.

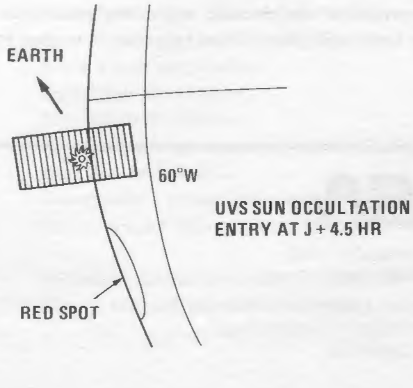
Then, the flash!

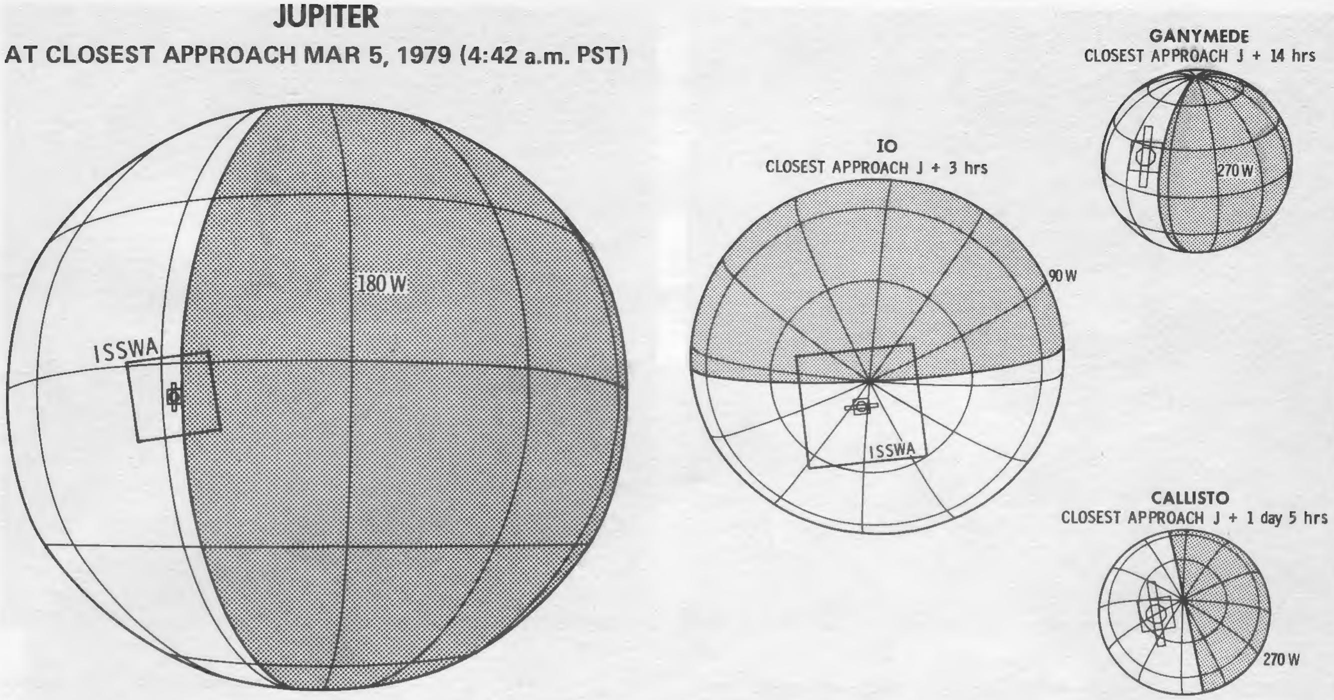
A focussing phenomenon for radio waves, the flash will last for about 1 second, during which the strength of the radio signals would increase about 100 times if there were no absorption of the signal by the atmosphere. The brief flash will allow measurement of atmospheric shape and absorption at a greater depth than possible at any other time. During this instant, Voyager 1 will be able to measure the concentration of components down to about the 4-bar pressure level with 100,000 times greater sensitivity.

And then, the spacecraft will exit Earth occultation, tracking the virtual image of the Earth until the spacecraft passes to the other side of the planet and reappears as seen from Earth.

During the Sun occultation, the UVS will probe the deep atmosphere, determining gases, composition, and temperatures.

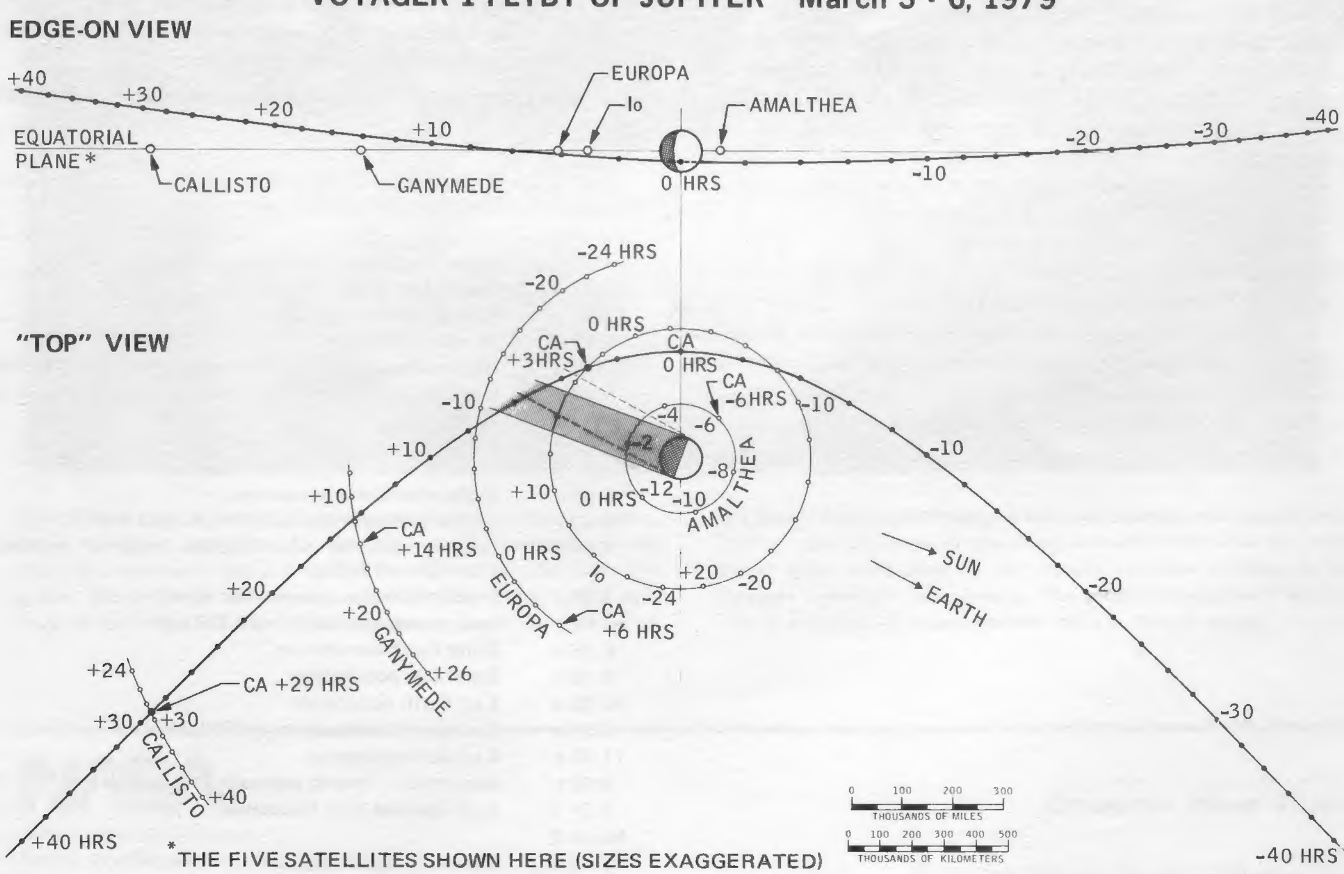






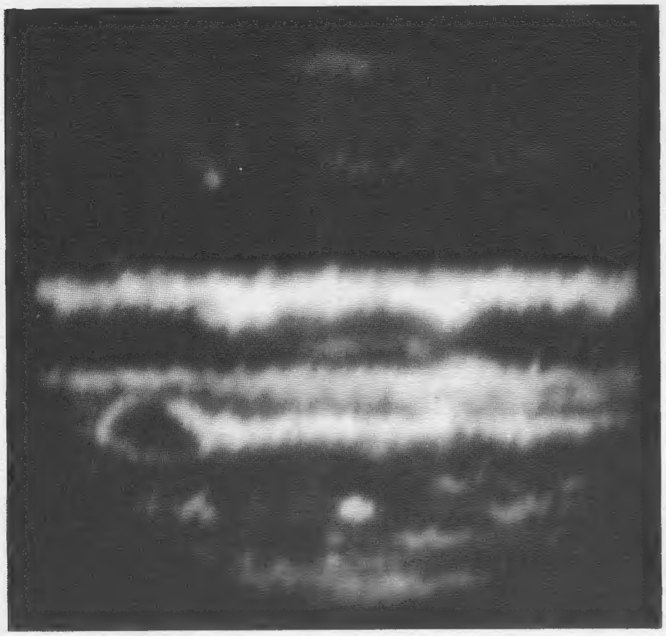
CLOSEST APPROACHES – Voyager 1 will make its closest approaches to Jupiter and its largest satellites on the morning of March 5, 1979, 18 months to the day after its launch. These computer generated plots show the spacecraft's view of the bodies at the times of closest approach. The instruments' fields of view are also shown (ISSWA is the FOV of the wide angle camera). The Red Spot will be on the opposite side of the planet when Voyager 1 gets its closest look at Jupiter at a point near the terminator (the dividing line between the lit and unlit sides of the planet). Three hours later, Voyager 1 will swing under the south pole of Io and spend about 4-1/2 minutes in the flux tube area. Closest approach to Ganymede eleven hours after Io will also be near the terminator. And 29 hours after its closest look at the giant planet, Voyager 1 will pass over the north pole of Callisto for its closest look at the outermost of the Galilean satellites.

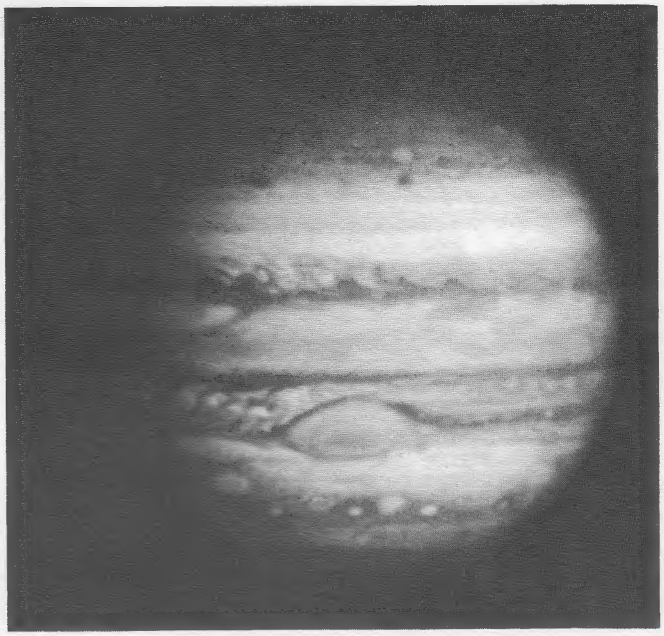
VOYAGER 1 FLYBY OF JUPITER March 3 - 6, 1979



*THE FIVE SATELLITES SHOWN HERE (SIZES EXAGGERATED) LIE WITHIN 1/2 DEGREE OF JUPITER'S EQUATORIAL PLANE.

CA = CLOSEST APPROACH





5-MICRON HOT SPOTS — An infrared photograph of Jupiter from Earth (left) shows heat radiating from deep holes in the clouds of Jupiter. Bright spots in the image are regions of higher temperatures than the darker areas, and correspond to parts of the atmosphere that are relatively free of obscuring clouds. The Great Red Spot appears on the west (left) limb as a dark area encircled by a bright ring, indicating that the spot is cooler than surrounding regions. This supports other findings that the Great Red Spot may stand as high as 25 km (15 mi) above the surrounding clouds and is, therefore, cooler. The infrared photo was recorded on January 10, 1979, by the 200-inch Hale Telescope on Palomar Mountain, California (operated by the California Institute of Technology and the Carnegie Institution) by R. Terrile of JPL. The Voyager 1 photo at right was also taken January 10, about one hour after the infrared image. The spacecraft was about 53.8 million km (33.4 million mi) from the planet.

A Turbulent Solar Wind

Voyager 1 has met Jupiter's bow shock three times. The first crossing of the shock, the area where the supersonic solar wind responds to the presence of Jupiter's magnetosphere, came about 7 a.m. (PST) on February 28, nearly 6.1 million km (3.8 million mi) from the planet.

Later, the solar wind increased, squashing the magnetosphere back towards the planet, and six hours after the first crossing, Voyager 1 recorded the bow shock again, at a distance of 5.9 million km (3.7 million mi).

By 5 a.m. (PST) on March 1, the solar wind had overtaken the spacecraft once again, pushing the bow shock to 5.1 million km (3.2 million mi).

Voyager 1 crossed the magnetopause about noon on March 1, placing the spacecraft inside the magnetosphere for the first time.

Sampling of Encounter Activities

(Continuous observations by radio science, magnetometers, low-energy charged particle plasma, and cosmic ray investigations, as well as mapping by imaging cameras, photopolarimeter, ultraviolet and infrared spectrometers.)

All times are Pacific Standard Earth-received event start times.

March 3	
10:54 a	Plasma outflow measurements (spacecraft maneuver)
4:40 p	Io eclipse observations begin
March 4	
4:40 a	Begin Near Encounter intensive activity
11:37 a	Search for "rings" of dust
12:33 p	First photos of Amalthea
6:12 p	IR observations of first 5-micron hot spot (Jupiter)
5:48 p	IR, imaging of Earth occultation exit point (Jupiter)
8:48 p	Last full mosaic of Great Red Spot on day side of Jupiter
11:00 p	Amalthea — closest approach (~ 416,942 km)
March 5	
4:05 a	Begin intensive Io encounter
4:43 a	Jupiter — closest approach (~ 280,000 km)
7:00 a	Imaging data to tape recorder (end of real-time imaging until 2:22 p)
7:38 a	Predicted Io flux tube passage starts
7:52 a	Io — closest approach (~ 20,253 km)
8:23 a	Enter Earth occultation
9:16 a	Enter Sun occultation
10:20 a	Exit Earth occultation
9:57 a	Europa — closest approach (732,245 km)
11:28 a	Exit Sun occultation
6:53 p	Ganymede — closest approach (~ 115,000 km)
7:31 p	End intensive Near Encounter
March 6	
9:46 a	Callisto — closest approach (~ 125,108 km)
1:03 p	Search for new satellites